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SHORT COMMUNICATION

Some insects active during a period of continuous frost in East Sussex—On 27.xii.2000 the weather where I live at Sedlescombe in East Sussex (TQ782188) suddenly turned unusually cold as it did elsewhere in the British Isles. On the afternoon of 30 December, after three days of almost continuous frost, it remained very cold with snow lying on the ground and unmelted on bushes and trees. Although bright and sunny, the soil and the surfaces of our garden ponds were hard frozen and a light but penetrating wind blew from the north. In the shade the temperature remained below freezing and only a small amount of thawing had occurred in the shelter of south-facing hedges in direct sunlight and similar places.

In view of these unpropitious conditions I decided to see if there were any free-flying, or free-moving, adult insects about, or if frost had either killed them or driven them into sheltered nooks and crannies from which they could not easily be disturbed. I used a net that I take on summer surveys and swept around the garden, concentrating on evergreens like holly, box, juniper and ornamental firs where insects usually shelter.

The following day, 31 December, a second walk was taken round the garden at midday. The overnight frost had been just as hard as on the previous three nights, but the temperature had risen a few degrees above freezing by mid-morning and there was a much stronger wind from the south-east. It was a raw, cold winter's day. The many insects collected were much the same species as those of the previous afternoon, with one or two not found before and one or two absent (as one might expect with any survey of this kind).

Many of the species were very tiny and delicate which, perhaps, makes it even more surprising that they were able to survive in such apparently adverse conditions.

The smallest was the springtail *Entomobrya nivalis* (L.) with some examples only just over 1 mm long (I imagine the name 'nivalis' meaning 'of the snow' was chosen because this species, which is common all year round, was found on snow, a habit well-known among a wide range of Collembola). Chironomids like the 1.6 mm *Gymnometriocnemus brumalis* (Edwards) and the delicate, green *Micropsectra junci* (Meigen) have a slender fragility that seems incompatible with their cold-resistance, but they must have a body chemistry that not only prevents freezing down to at least a modest level of sub-zero temperatures, but allows normal metabolic activity.

In all 20 species of insect were collected, some being present in considerable numbers. Many species of spider were also seen but not identified. The insects were all in an active state and fully capable of flying (or jumping) from the net, though they must have survived three or four nights in the open as it is extremely unlikely that they could have emerged from pupae beneath frozen leaves or under iced ponds. Nearly all are common winter-flying species in our area and often in evidence through their swarming habits in milder weather.

My brief survey in this very cold spell shows that many adult invertebrates are capable of surviving and remaining active during such periods. Thus, while they may not venture forth from the shelter of evergreens and similar places, they retain the ability to avoid predators. As well as being of interest in their own right, these hardy species must represent an important food resource for resident insectivorous birds and spiders.

The following species were recorded: Collembola, Entomobryidae: *Entomobrya nivalis* (L.); Hemiptera, Cicadellidae: *Empoasca vitis* (Göthe); Psyllidae: *Psylla melanoneura* Förster; Triozidae: *Trioza urticae* (L.); Coleoptera, Chrysomelidae: *Aphthona atrocaerulea* (Stephens); Diptera, Trichoceridae: *Trichocera annulata* Meigen, *Trichocera regelationis* (L.), *Trichocera saltator* (Harris); Chironomidae: *Brillia modesta* (Meigen), *Chaetocladius piger* (Goetghebuer), *Gymnometriocnemus brumalis* (Edwards), *Limmophyes habilis* (Walker) (This is the *L. habilis* as defined by Saether (1990) and the *L. trimorum* of many earlier authors) *Micropsectra junci* (Meigen); Bolitophilidae: *Bolitophila saundersii* (Curtis); Mycetophilidae: *Synplasta excogitata* (Dziedzicki), *Exechia ?dorsalis* (Staeger) (♀), *Phronia biarcuata* (Becker), *Mycetophila (ruficollis group) sp. aff. evanida* Laštovka (♀); Anthomyiidae: *Hylemya nigrimana* (Meigen).

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